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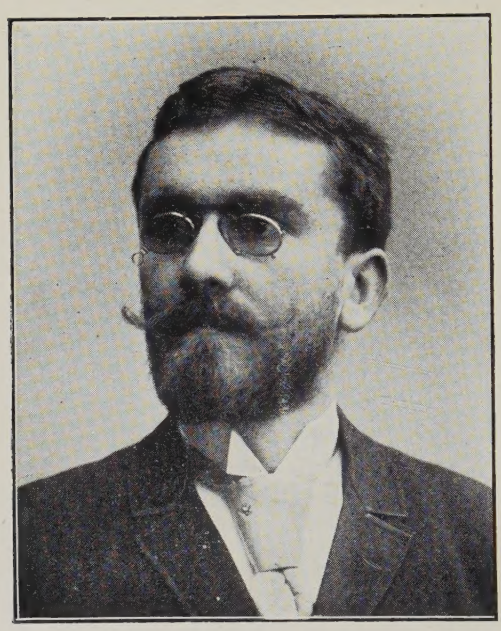

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Journal of Mycology

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ARTHUR'S UREDINALES OF THE NORTH AMERICAN FLORA.

W. A. KELLERMAN.

This exhaustive monograph constitutes Part 2 of Volume 7 of an important publication which is being issued by the New York Botanical Garden, as rapidly as the Orders are worked up by specialists. This paper is the fourth Part appearing to date.

The Order Uredinales, by Joseph Charles Arthur, as here treated, consists of the three families *Coleosporiaceae, Uredinaceae,* and *Aecidiaceae.* The first family occupies pages 85-96, and the second, pages 97-128 of this Part of the Flora; fourteen (of the thirty-seven) genera of the family Aecidiaceae are included in the remaining pages (129-160) of Part 2. Only a few botanists, if indeed any outside the devotees of Uredinology, will not be surprised at the radical treatment of this group — the innovations proposed.

It is the purpose of this review to point out what Dr. Arthur has done rather than to pronounce judgment on any part of his work. For years he has devoted his energies to the study of Rusts. His culture-work, study of life cycles, genetic relationships, and morphology, have prepared the way for, and culminated in this splendid monograph, which we will now proceed to analyze.

The usual anatomical characterization is given of the Order which need not be recounted; but the series of spores can not be

understood unless given in his own words, which are as follows: Spores of five morphological sorts, not all present in every genus;

1. Basidiospores; minute, thin-walled, without surface sculpturing.
2. Pycniospores; small, smooth, of unknown function.
3. Aeciospores; verrucosely sculptured, borne in chains.
4. Urediniospores; echinately or verrucosely sculptured, singly, or sometimes in chains (*Coleosporium, Melampsoropsis.*)
5. Teliospores; smooth or variously sculptured but not echinulate, borne singly or in chains.

The last four named may be present but any one or all but the teliospores may be wanting in certain genera. In many genera an alternation of phases is conspicuously shown, says the author, the pycnia (rarely absent) with one other spore-structure comprising the gametophytic phases, and the telia usually with one other spore-structure, the sporophytic phase. In every species the mycelium eventually gives rise to teliospores, which produce in germination four bodies, either remaining within the spore-cell (*Coleosporium*), or borne in the air on a short mycelium, each basidium supporting a single, stalked or sessile basidiospore.

Whether the basidia are internal or external is the fundamental character determining the families; if internal, the family *Coleosporiaceae;* if external, the families *Uredinaceae* and *Aecidiaceae.* The two latter families are readily separated according to the character of the teliospores — they are compacted laterally into a crust or column (rarely solitary within the tissues) in the Uredinaceae, and free or fascicled in the Aecidiaceae.

Dr. Arthur recognizes for the first family two North American genera — *Coleosporium,* the life-cycle with all spore forms; and *Gallowaya,* with only telia. The latter genus was proposed by the author of the monograph under consideration, last year, before the Botanical Congress at Vienna, to include the single species G. pini (*Coleosporium pini* Gall.)

The genus Coleosporium is concisely but fully described. Attention is here called to one of the statements, as follows: "Teliospores sessile (by successive formation and by displacement due to lateral pressure often appearing catenulate and pedicellate), one-celled (by early division of the contents appearing four-celled)." Dietel's *Stichopsora* is not recognized as a valid genus, but placed as a synonym under Coleosporium.

The synopsis or key to the species (twenty-four in number) of Coleosporium is similar in structure to all the species-keys that follow and can be explained in a few words. The main divisions are based on the groups of the hosts. Thus, "Telia and uredinia inhabiting monocotyledonous hosts (Orchidaceae)" leads to C. bletiae; "Telia and uredinia inhabiting dicotyledonous

hosts" leads to "Hosts belonging to Grossulariaceae" (C. ribicola), to "Host belonging to family Loasaceae" (C. mentzeliae), etc. In case of some groups (say Carduaceae) the tribes are recognized (as Vernonieae, Eupatorieae, Astereae, etc.) in separating the species. Then below this, when there are two or more species, morphological characters are called into requisition. Synonomy and exact citations both for the genus and species are given. The convenient paragraphing of the full though concise descriptions is to be highly commended. Under each species the hosts are enumerated — the family in each case first given; then follow the type locality, the distribution, illustrations when any, and finally the exsiccati are cited.

Four new species of Coleosporium are here described, namely, C. begoniae from Mexico, C. lacinariae from Florida and Alabama, C. arnicale from Washington, and C. occidentale also from the State last named. Some new combinations are made; thus Dietel and Holway's Stichopsora mentzeliae and Schweinitz's Caeoma (Uredo) helianthi are made Coleosporiums; and of the latter are listed, as synonyms, Dietel and Holway's C. viguierae and C. verbesinae. Uredo terebinthinaceae and Caeoma (Uredo) terebinthinaceae of Schweinitz are included in Coleosporium terebinthinaceae (Schw.) Arthur.

When we turn to the family Uredinaceae we realize more fully the radical and progressive mode of treatment. The diagnosis of the family, which has the basidia external, is otherwise sufficiently concise and definite, the main points expressed as follows: Telia forming a more or less definite crust or column; teliospores compacted into layers, or rarely solitary within the tissues (Uredinopsis), sessile. And this family includes these eighteen genera: Uredo, Physopella, Bubakia, Pucciniastrum, Melampsoridium, Melampsorella, Hyalopsora, Calyptospora, Necium, Uredinopsis, Melampsoropsis, Cronartium, Cerotelium, Cionothrix, Alveolaria, Baeodromus, Endophyllum, and Puccinosira. Even one claiming to be a uredinologist could scarcely say this list with his eyes shut — in fact he might stumblle if his eyes were open!

The genus *Uredo,* Arthuri sensu, includes the plants mostly going under the names of Melampsora Cast., Physonema Lév., Podosporium Lév., Podocystis Fries. and Caeoma Tul. It is evident that this is not the form genus Uredo so familiar to all, in service so long, and perhaps destined to further use in the same sense. In fact Dr. Arthur has elsewhere said that he proposes "in his own work to retain such names as Peridermium, Caeoma, Roestelia, Uromyces, and Puccinia as form genera for imperfectly understood species, and even Uredo and Aecidium in their customary acceptance as form genera, if a better course does not become evident. These will constitute an *Anhang* for recording undistributed and imperfectly known forms." It is

understood of course that the application of the rule of priority has brought the real generic name Uredo uppermost. Our species then are as newly denominated: Uredo medusae (Thuem.) Arthur; Uredo confluens (Juel) Arthur; Uredo rostrupiana Arthur; Uredo bigelowii (Thuem.) Arth.; Uredo albertensis Arthur; and Uredo lini Schum.

The second genus of this family, Physopella, includes the Uredo vitis Thuem., Uredo ficina Juel, Uredo fici Cast., Uredo artocarpi B. & C., and Uredo aeschynomenis Arth. The third genus, Bubakia, was based on Thichobasis crotonis Cooke; and one more species of our flora is added, namely, Bubakia mexicana Arthur n. sp.

The three genera just enumerated constitute the subfamily *Uredinatae* — having their pycnia and other sori subcuticular or originating between the epidermis and mesophyll; the teliospores compacted into dense layers forming a crust; aecia when present with periderm. The next seven genera (Nos. 4-10 of this family) form the subfamily *Pucciniastratae* — having subcuticular pycnia but the other sori originating between the epidermis and mesophyll; teliospores divided by vertical partitions or one-celled, forming imperfect layers, or solitary; aecia when present with cylindrical periderm, rupturing irregularly above. The members of this subfamily are enumerated in the next paragraph.

The genus Pucciniastrum Otth, established in 1861, is retained, the genera proposed by Mganus in 1875, Phragmopsora and Thekopsora, being listed as synonyms. Under this we find the forms well known in literature as Uredo goodyerae Tranz., Uredo hydrangeae B. & C., Uredo agrimoniae Schw., Uredo arcticus Lagerh., Uredo pustulata Pers. (and Melampsora epilobii Fckl.), Aecidium pyrolae Pers. (Melampsora pirolae Schroet. and Uredo chimaphilae Peck), Melampsora sparsa Wint. (Pucciniastrum arbuti D. & H. and Uredo copelandi Syd.), Uredo minima Schw. and Caeoma azaleae Schw., and Aecidium (?) myrtilli Schum. (Melampsora vaccinii Wint.). The last named species may be taken as a fair case to display the usual synonomy that thorough study develops. The name is used in the monograph is Pucciniastrum myrtilli (Schum.) Arth. 1906; the synonyms being:

Aecidium (?) myrtilli Schum., 1803.
Uredo pustulata vaccinii Alb. & Schw., 1805.
Uredo vacciniorum DC., 1815.
Caeoma vacciniorum Link, 1825.
Thecopsora (?) vacciniorum Karst., 1879.
Melampsora vaccinii Wint., 1881.
Melampsora vacciniorum Schroet., 1887.
Pucciniastrum vacciniorum Dietel, 1897.

The fifth genus, Melampsoridium, established by Klebahn, 1899, includes one species, M. betulae (Schum.) Arthur — the aecia on Larix not yet found in America, the uredinia and telia on Betula, widely distributed. The sixth genus also includes but one species — Melampsorella elatina (Alb. & Schw.) Arthur, the aecia on Abies and the I and II forms on Alsine and Cerastium. The seventh genus has this representation: Hyalopsora aspidotus (Peck) Magn., Hyalopsora polypodii (DC.) Magn., Hyalopsora laeviuscula (Diet. & Holw.) Arthur, and Hyalopsora cheilanthis (Peck) Arthur; the hosts for these all being plantae polypodiaeceae. The next occurs on Vaccinium (the aecia on Abies not recorded for America), namely Calyptospora columnaris (Alb. & Schw.) Kuehn. Then we haye a new genus, *Necium*, with the single species, N. farlowii Arthur n. sp. on Tsuga canadensis (L.) Carr. The tenth genus is exclusively filicicolous, Uredinopsis, founded by Magnus in 1893. The American species are U. osmunda Magn., U. mirabilis (Peck) Magn., U. pteridis Diet. & Holw., U. copelandi Syd., U. struthiopteridis Stroemer, and U. phegopteridis Arthur n. sp.

The last two subfamilies of the Order Uredinaceae are *Chrysomyxatae*, with the cingle genus Melampsoropsis; and *Cronartiatae*, with the genera Cronartium, Cerotelium, Cionothrix, Alveolaria, Baeodromus, Endophyllum, and Pucciniosira. In both these subfamilies the pycnia and other sori originate beneath the epidermis, and the teliospores are catenulate. In *Chysomyxatae* the aecia (if present) rupture their periderm apically; in *Cronartiatae*, when present their inflated periderm has circumscissile dehiscence. The urediniospores in the first are catenulate; in the second they are borne singly on pedicles.

We content ourselves with a mere enumeration of the species of the two subfamilies just outlined, most of which will be at once recognized by mycologists: Melampsoropsis empetri (Pers.) Arth.; M. pyrolae (DC.) Arth.; M. ledicola (Peck) Arth.; M. cassandrae (Peck & Clinton) Arth.; M. abietina (Alb. & Schw.) Arthur; M. arctostaphyli (Dietel) Arth.; M. piperiana Arthur n. sp.; M. chiogenis (Dietel) Arth.; Cronartium comptoniae Arth.; Cr. comandrae Peck.; Cr. quercus (Brondeau) Schroet.; Cr. ribicola Fisch. de Waldh.; Cr. coleospoirides (Diet. & Holw.) Arthur; Cerotelia canavaliae Arth.; Cionothrix Arthur n. gen. and C. praelonga (Wint.) Arthur; Alveolaria cordiae Lagerh.; Baeodromus eupatorii Arthur; B. holwayi Arth.; B. californicus Arth; Endophyllum rivinae (B. & C.) Arthur; End. vernoniae Arthur; Pucciniosira pallida (Speg.) Lagerh.; and P. brickelliae Diet. and Holw.

An analysis of the Aecidiaceae will be reserved until the next part of the North American Flora appears with the conclusion of that family.

Here it may be remarked that the large page, clear type,

careful citation, admirable descriptions, host lists, etc., as well as the synoptic keys to the families, the genera, and the species, are all to be most highly commended.

This publication deals with minute plants and as has been well said they must be studied with a corresponding minutia. We may regret it but it was inevitable — the simplicity of the old order of things has disappeared. To know the Rusts is to know their life histories, their spore forms, the structure of the sorus, and the various morphological characters — all of which, together with apparent phylogenetic relationships, have been employed by the author in constructing this exhaustive monograph, epoch making and destined to become classic.

AN APPLE ROT DUE TO VOLUTELLA.

F. L. STEVENS AND J. G. HALL.
N. C. Agr. Exp. Station.

A black rot of apples closely imitating in appearance that caused by Sphaeropsis, but differing from the sphaeropsis rot in several details, has been observed frequently in various sections of this State, on native apples and on apples shipped into the State from a distance.

In general appearance the disease consists of a rotten black spot upon the fruit. The central and older portions of the decayed region are of an intense coal black color. The younger region of the spot, its outer border, a zone about 14 mm. in width, is brownish.

Close inspection reveals the presence of slightly elevated pimple-like places in the cuticle. These are found to within 3 or 4 mm. of the edge of the spot, and become larger and more pronounced as the center of the spot is approached. Indeed the black color of the spot is due to the thick setting of these black pimples all over its surface. In many instances unless the spot be very old no other development is seen, and the disease might readily be considered to be the ordinary black rot caused by Sphaeropsis, and doubtless often passes for it. In older spots however, the pimples are seen to have broken through the cuticle of the apple, and each pimple appears as a small wart-like excresence, and a good lens shows that it is thickly beset with stiff black hairs. These hairs constitute the distinctive character of this disease, and serve to separate it with ease and certainty from the Sphaeropsis rot, provided the rot has developed far enough to exhibit this character.

On slicing the apple open it is seen that the zone most recently invaded is brownish, while all the older portion is black.

While the decayed portions are softer than the healthy, this is in no sense a wet rot, the softness being due to a spongy dryness rather than to a watery dissolution. Upon microscopic examination the cells of the old, dark, diseased portion of the apple are found to be filled with a tangled mass of black or dark brown fungous threads which are richly septate and much branched (Fig. 1). In thickness they vary from 5 to 7 μ in the older portions. In the newly invaded cells the mycelium is usually only about 2 μ thick and is colorless.

As the spot ages the mycelium develops more abundantly in a few layers of cells next to the cuticle, particularly immediately under the cuticle. From this sub-cuticular layer of tangled mycelium there develops a cushion of hyphae which are arranged parallel and stand upright, perpendicular to the substratum. These hyphae are quite uniform in thickness and regular in arrangement, composed of short, rectangular cells (Fig. 2). These upright hyphae increase in length, rupture the cuticle and develop the tubercular mass, "sporodochium," characteristic of the order Tuberculariales. The sporodochia attain a height of 100 to 125 μ and a diameter nearly twice as great. About midway from base to top of the sporodochium the hyphae become narrower and the setae have their insertion. The setae develop directly from hyphae which stand amid sporophores and are indistinguishable from them, their only point of difference being that the setigerous hyphae broaden out at the end and develop into typical setae while the sporogenous proceed to spore development. Each setum is produced from the tip of a single hypha (Fig. 3). The setae are from 100 to 400 μ long, tapering from the base to tip. At base they are 5 to 8 μ broad and bear from 2 to 5 septae (Fig. 4).

At the upper end of the erect fuscous or black hyphae, which constitute the sporodochium is a simple, slender hyaline stalk "condiophore" from 25 to 35 μ by 3 μ which bears the spore. The conidiophores together constitute the outermost layer of the sporodochium. The spores are produced acrogenously, being cut off from the tips of the conidiophore by constriction of the fertile hyphae.

The spores are oblong-fusoid to falcate-fusoid with acute ends (Fig. 5) hyaline or very slightly olivaceous, continuous, though with the low power of the microscope they often appear uniseptate owing to peculiarities of the protoplasm in this region. They measure from 17 to 23 μ long by 2.5 to 3.5 μ broad.

Placed in apple agar in hanging drop cultures they germinate in about three hours; at first by a single hyphal thread near one end of the spore, but later other points of germination can be seen. When germination begins the spores become very coarsely granular. The granules become fewer in number and larger as germination proceeds. Later by the migration of the

granules into the young hyphae clear spaces appear. Often the end of the germ tube swells, becomes cut off by a wall and rapidly assumes a dark color and, in general, takes on the appearance of the black bodies which are so characteristic a feature in the germination of the anthacnoses. As with the anthracnoses this body may remain without further development or it may germinate immediately (Fig. 6).

There has been much doubt as to the true nature of these structures. Frank[1] regarded them as holdfasts to assist in securing penetration into the host. Hasselbring[2] as the result of recent investigation regards them in he same light. Other writers have variously considered them as spores, secondary spores, buds, gemmae chlamydospores, etc. References to the literature regarding these bodies is to be found in Hasselbring's article.

These structures have been described for Colletotrichum and Gleosporium, one of the authors of this paper having studied them in some twenty-five species from these two genera,[3] in Polystigma, Fusicladium and Volutella.[4]

Transfers into solidified pea agar and apple agar plates were made under aseptic conditions from the regions immediately beneath the skin in a diseased spot, also from the diseased tissue near the boundary between diseased and healthy portions, and in every instance pure cultures of the fungus were obtained. Pure cultures were also obtained by plating from water containing the spores of the fungus.

Grown upon plain agar or pea agar the mycelium was hyaline with many black tubercles; on agar containing carbohydrates as starch or sugar the mycelium was densely black.

In none of the cultures upon artificial media were spores formed. On sterilized apple twigs, however, spores were formed in great abundance. The mycelium on this medium was at most only slightly fuscous and was in most cases hyaline.

Inoculations were made from mycelium grown in pure cultures by pricking the skin of an apple and laying on, or inserting, a bit of the mycelium. Within a few days a well developed spot was obtained.

Many attempts were made to secure inoculations through unbroken cuticle but in no instance with success. It is evident that a bruise or break of some kind is necessary. This evidence correlates well with the fact that the disease, as is true of so many fruit diseases, is much more common at the blossom end,

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[1] Ueber einige neue und weniger bekannte Pflanzenkrankheiten. Ber. Deut. Bot. Ges. I: 29-34, 58-63. 1883.

[2] The Appressoria of the Anthacnoses Bot. Gaz. 42, 135.

[3] See article by Halsted: The Secondary Spore in Anthracnoses, N. J., Agr. Experiment Station Report. 1892, 303.

[4] Stoneman, A Comparative Study of Some Anthracnoses, Bot. Gaz. 26: 69, 1898. Plate 13, fig. 82 and Plate 14, fig. 86.

or the stem end, than at other points. The rot occurs at either end of the fruit more often than elsewhere, because it is at these places that the cuticle is most liable to injury.

The tubercular development places the fungus unquestionably among the Tuberculariales. Further the road is not so clear. Judging strictly from the color of the mycelium it must go to the Dematiae, but a glance over its possible kin there reveals none which are of certain affinity. Admitting that it is possibly a Mucedineae, it clearly must belong to the genus Volutella. This genus is made up mainly of light colored fungi, though several of the genus are very dark, notably *V. Acalyphae, oxyspora, Violae, Citrulli* and *Allii.* From a structural viewpoint this fungus seems much closer to Volutella than to any of the Dematiae. In view of the purely physiological nature of the color character, as shown by our cultures, it being dependent upon the presence of carbohydrates — which is present in abundance in the natural medium of the apple — we believe we are doing no violence to facts in placing it in the genus Volutella.

As a Volutella it stands closest to the species named above, yet is distinct enough from them to be regarded as a separate species for which a description is herewith proposed.

It differs from oxyspora in larger sporodochium, 150-400 μ and longer setae, shorter spores and longer basidia; from Citrulli in shape of spores; from Allii, sporodochia larger not convex or elongate, setae longer; from Violae in character of sporodochium, see Bot. Gaz. 26:85, Pl. XIV; from Acalyphae in size of spores.

Volutella fructi Stevens & Hall n. sp.

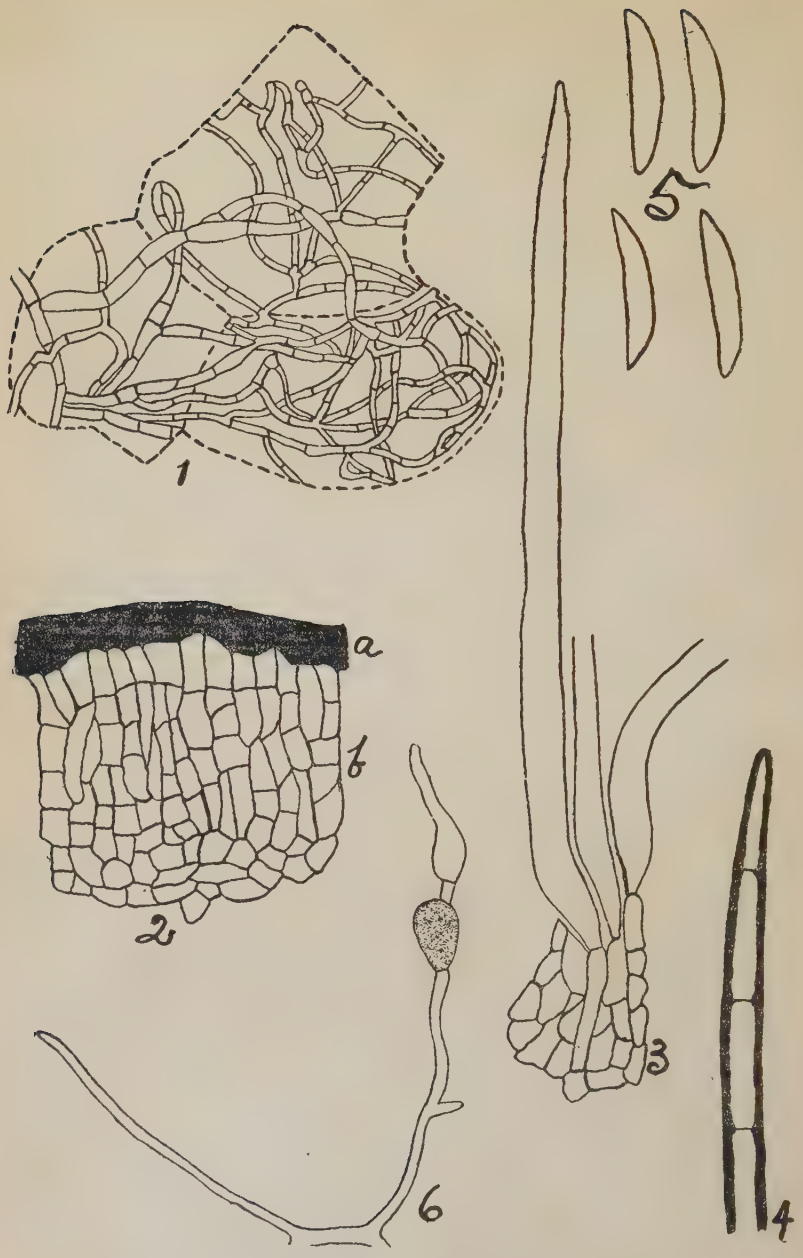
Sporodochia numerous in concentric circles, early subcuticular then erumpent, elevated, black, 150-400 μ diameter; mycelium, black in presence of carbohydrates, otherwise hyaline. Setae; distributed throughout sporodochium, black 0-5 septate, acute, smooth, 100-400 μ long, 5 to 8 μ thick. Sporophores; elongate, hyaline, simple, 25-35 by 3 μ. Conidia; hyaline or very slightly olivaceous, continuous, smooth, oblong-fusoid to falcate-fusoid 17 to 23 by 2.5 to 3.5 μ.

Habitat: fruit of *Pyrus Malus.* North Carolina, type N. C. Agr. Experiment Station No. 780.

EXPLANATION OF FIGURES.

FIG. 1. Three apple cells invaded by the mycelium of Volutella.

FIG. 2. Showing early stages in the development of the sporodochium before the rupture of the cuticle. (a) Cuticle of the apple; (b) Columnar arrangement of the fungous hyphae.



VOLUTELLA FRUCTI.

FIG. 3. Showing origin of setum from a single hypha.
FIG. 4. Portion of setum showing septae.
FIG. 5. Spores.
FIG. 6. A germinated spore (a); showing also one of the appressoria (b).

FUNGI SELECTI GUATEMALENSES. EXSICCATI DECADE II.*

W. A. KELLERMAN.

In this decade specimens of three new species (recently described in the Journal of Mycology) are presented, namely Aecidium byrsonimae Kern & Kellerman, Puccinia heliotropii Kern & Kellerman, and Uredo trixitis Kern & Kellerman; also species on heretofore unreported hosts are shown, as well as specimens exhibiting an extended range of the fungus. The species and their hosts are as follows:

11. Aecidium byrsonimae Kern and Kellerman on Byrsonima crassifolia (L.) H. B. K.
12. Balansia trinitensis Cooke & Massee on Panicum sp. indet.
13. Coleosporium plumierae Patouillard on Plumiera rubra L.
14. Puccinia conoclinii Seymour on Eupatorium rafaelense Coulter.
15. Puccinia heliotropii Kern and Kellerman on Heliotropium indicum L.
16. Puccinia purpurea Cooke on Sorghum vulgare Pers.
17. Puccinia tetramerii Seymour on Blechum brownei Juss.
18. Puccinia tithoniae Dietel & Holway on Tithonia tubaeformis Cass.
19. Uredo biocellata Arthur on Pluchea odorata Cass.
20. Uredo trixitis Kern and Kellerman on Trixitis frutescens P. Br.

11. Aecidium byrsonimae Kern & Kellerman

On Byrsonima crassifolia (L.) H. B. K.

Sierra de las Minas (Departamento Baja Verapaz), opposite El Rancho, alt. 615 m. 2050 ft.) Guatemala, C. A.
March 10, 1905.
W. A. Kellerman, No. 4325.

The published note concerning this Aecidium by Mr. Kern is as follows: An interesting species because of the hypertrophy it produces,

*Contributions to Guatemalan Mycology. V.

the prominent subcuticular pycnia, and the long and numerous aecia, but especially on account of the very odd spores, which are exceedingly large, with coarsely marked thick walls, much thickened above. The characters of the pycnia and aecia are so unlike those of autoecious species on Malpighiaceae that it is assumed to be heteroecious. The fact that the pycnia are subcuticular indicates that it does not belong to the Uromyces-Puccinia group but to some genus of the Raveneliatae or Uropyxidatae. Both host and fungus of a specimen in the New York Botanical Garden, collected at Rancho Guerro, Jalisco, Mexico, June 15, 1892, by M. E. Jones, said to be on an Ericaceous host, agree perfectly with this Guatemalan specimen. Because of the long, bladdery peridia there is a resemblance to Peridermium, and the Mexican specimen has been so labeled, but there can now be no doubt that it belongs here.

12. Balansia trinitensis Cook & Massee

On Panicum sp. indet.

Sierra del Mico, between Los Amates and Izabal, alt. 360 m. (1200 ft.), Depart. Izabal, Gautemala, C. A. February 23, 1907.

W. A. Kellerman, No. 6079.

This fungus was found in a single locality, a moist mountain ravine, infesting a dense clump of the large grass which for the most part had succumbed to the parasite. The material was submitted to Professor Atkinson for identification. This species was first detected in Trinidad, the host being Panicum palmifolium.

13. Coleosporium plumierae Patouillard

On Plumiera rubra L.

El Palmar, alt. 615 m. (2050 ft.), Depart. Quezaltenango, Guatemala, Central America. February 11, 1906.

W. A. Kellerman, No. 5460.

The material was placed in the hands of Frank D. Kern for identification; he reports as follows: This is the first time this species has been collected on the continent, the other collections coming from the West India Islands. The host has been identified by John Donnell Smith.

14. Puccinia conoclinii Seymour

On Eupatorium rafaelense Coulter.

Volcano Cerro Quemado, alt. 2700 m. (9000 ft.), Departmento Quezaltenango, Guatemala, C. A. February 8, 1906.

W. A. Kellerman, No. 5449.

The host was determined by J. M. Greenman; the Rust was identified by Frank D. Kern. The Rust has been collected in the United States on Eupatorium (Conoclinium) coelestinum and Eupatorium incarnatum, extending from Illinois to Louisiana; in Guatemala it was obtained on Eupatorium pycnocephalum and on the host named above.

15. Puccinia heliotropii Kern & Kellerman

On Heliotropium indicum L.

Gualán, alt. 122 m. (400 ft.), Dept. Zacapa, Guatemala, Central America. March 12, 1906.

W. A. Kellerman, No. 4326.

Host No. 4326 bears the type, of which material the specimen here issued is a part. The collection on host No. 4372 (determnied by John Donnell Smith), as stated by Mr. Kern also bears aecia which without doubt belong to an entirely distinct species of rust. The species here under consideration is of the ordinary leptopuccinia type. It differs from Puccinia heliotropicola Speg. by the longer and more oblong spores with a thickened apex.

16. Puccinia purpurea Cooke

On Sorghum vulgare Pers.

Antigua, alt. 1520 m. (5066 ft., Depart. Sacatepéquez, Guatemala, Central America. February 8, 1907.

W. A. Kellerman, No. 6074.

Apparently not common in Guatemala; found in only one locality —a few plants in the court of the hotel "El Manchen," at Antigua, these being seriously infected.

17. Puccinia tetramerii Seymour

On Blechum brownei Juss.

Laguna (Lake Amatitlán), alt. 1200 m. (3950 ft.), Depart. Amatitlán, Guatemala, C. A. January 17, 1906.

W. A. Kellerman, No. 5400.

The host was determined by John Donnell Smith. The Rust was passed on by Frank D. Kern and Dr. Arthur. The type specimen of this species was collected in Oaxaca, Mexico, (issued in Pringle's Mexican Fungi, No. 9, Sept. 1, 1896), on leaves of Tetramerium aureum Rose.

18. Puccinia tithoniae Dietel & Holway

On Tithonia tubaeformis Cass.

Laguna (Lake Amatitlán), alt. 1200 m, (3950 ft), Depart. Amatitlán, Guatemala C. A. January 30, 1906.

W. A. Kellerman, No. 5425.

The Rust was determined by Frank D. Kern and Dr. Arthur, the host by John Donnell Smith. It seems to be common in Guatemala. It was originally collected in Mexico by E. W. D. Holway, on Tithonia tubaeformis and T. tagetiflora. The authors of the species remark that it is much like P. helianthi Schw., but the spores are darker, average smaller, and the septum is less thickened at the sides.

19. Uredo biocellata Arthur

On Pluchea odorata Cass.

Amatitlán, alt. 1200 m. (3950 ft.), Depart. Amatitlán, Guatemala, Central America. January 25, 1906.

W. A. Kellerman, No. 5388.

The Rust was determined by Frank D. Kern and Dr. Arthur, and the host by J. M. Greenman. Mr. Kern says: The sides of the spore in this species are inflated in a very conspicuous manner making them unusually odd. It has been known before only from the type locality, Florida Keys, on Pluchea purpurascens.

20. Uredo trixitis Kern & Kellerman

On Trixis frutescens P. Br.

San Lucas (Toliman), alt. 1515 m. (5050 ft.), Depart. Solalá, Guatemala, Central America. February 15, 1906.

W. A. Kellerman, No. 5432.

Mr. Frank D. Kern states: This host was determined by J. M. Greenman and belongs to a section of the *Carduaceae* which does not include any other genera known to bear rusts.

THE PHALLOIDEAE OF TEXAS.

BY WILLIAM H. LONG.

The fall of 1902 was unusually wet for this State and cold weather was late in coming, as our first good frost did not occur until Nov. 22. Such climatic conditions brought forth a wealth of fungi; the Basidiomycetes and Gastromycetes being especially abundant. It was the good fortune of the writer to collect and have photographed five species of that unique and interesting group of Gastromycetes — the *Phalloids.*

He was especially fortunate in securing an abundance of eggs, expanded plants, etc., of two species, thereby making possible a study of the variations that occur in a given species. The habitats of these plants are much the same, at least for four out of the five species collected. They require a soil loose enough so that the eggs can form readily, and it must be fairly rich in decaying vegetable matter and usually *not shaded.*

In an old sandy field, that had not been ploughed for seven or eight months, four species were found, viz: *Mutinus caninus, Phallus rubicundus, Phallus impudicus* var. *imperialis,* and *Simblum sphaerocephalum.* This field was on the north slope of

a hill that was originally covered with post oak (*Quercus minor*) and black jack (*Q. nigra*), but the trees had been cut off for some years and the old stumps were in various stages of decay.

At the base and in the immediate vicinity of these rotting stumps the plants mentioned were usually found. On the margin of this field in the grassy unbroken sod *Simblum texense* was collected. This field was planted in wheat in the fall of 1901 and was used as a pasture for cattle during 1902.

Nearly all of the photographs secured were taken by a local photographer on cloudy days and in some instances when the rain was falling, as this group will not admit of delay if photographs of the freshly expanded plants are desired. Some here reproduced therefore do not show details as well as could be desired.

The abundance of material at hand of some species made it possible for the writer to determine the relative values of the various characters of a given species.

The following characters were found to be constant for any given species, viz: Color of stipe, pileus and eggs, surface markings of cap, structure of stipe as to number, shape and openings of the chambers; variable characters were: shape of both stipe and pileus within narrow limits, presence or absence of a veil, size of stipe and cap and shape and size of eggs.

Take the cap of *Phallus impudicus* for instance. It was invariably white and strongly reticulate, but its size and shape was very variable in some plants being very unsymmetrical but more or less conic to campanulate but even in specimens only two inches tall the surface had the characteristic crests and ridges. On some specimens no veil could be detected, while on others there was a strongly developed veil, but this point will be discussed more in detail later in this article.

In *Simblum texense* the variation in shape and size of pileus and stipe was very marked; the stipe being cylindrical, fusiform, clavate, attenuate downward or upward, terete or angular, while its color and structure was constant; the pileus likewise was very variable as to shape and size, some specimens being deeply constricted at juncture of pileus and stipe, while in others there was no constriction. Some had the Simblum characters well defined, while others looked more like a Lysurus with short arms than a Simblum. Indeed it is difficult to determine the genus of this plant from the ordinary field specimens.

The first specimens found of *Phallus impudicus* var. *imperialis*, consisted of two separate bunches of eggs. One bunch of four eggs from a common rhizomorph, the other of eight plants also from a common root. All of the eggs in the first group were infested by the larvae of some unknown fly (*Muscidae*), also several eggs in the second group. This is the first instance to the writer's knowledge of an insect attacking the eggs of

any of the Phalloids, altho it is well known that various species of flies (*Muscidae*) eagerly suck the syrupy mass of spores as the gleba deliquesces — by this means the wider distribution of the spores is accomplished; while the passage through the digestive tube of the fly may aid in the germination of the spores. A microscopic examination of the excreta from the flies that are feeding on the deliquescent gleba shows it to be composed largely of spores, apparently unharmed. This syrupy mass acts on them like a dose of salts, producing a kind of diarrhoea.

A third insect was found feeding on all the Phalloids except *Simblum texense* — a species of dung beetle or "tumble bug" (*Geotrupes opacus* Hald.). The beetles first attack the stipe. One was found on the stipe of *Phallus impudicus* eating a circle around it, thereby cutting it down; its mate was at the base of the plant, busily engaged in digging a hole in the ground; when the stipe fell both beetles attacked it.

This species of dung beetle apparently makes no balls but digs holes under the mass of dung on which they may be feeding. It is interesting to note that the same process was followed while feeding on the Phalloids. They eat the stipe down to the ground but do not attack the volva; the entire stipe and cap was often devoured so that nothing was left but the stump of the stipe in the volva and the numerous holes that the beetles had dug near by. I found specimens of *Phallus rubicundus, Phallus impudicus, Mutinus caninus,* and *Simblum sphaerocephalum,* all attacked and eaten by this beetle, but strange to say, not one plant of the many specimens found of *Simblum texense* was eaten — probably because this plant has not the foetid odour so characteristic of this group.

At one time I had about one hundred and fifty to two hundred eggs of the various species of Phalloids in my "incubator" and during the course of their expansion it was noticed that *cold* had a marked effect on the elongation of the stipe — in all cases checking it; and when the thermometer was below or near freezing point stopping all elongation. This was so marked that I had to resort to artificial heat to get some of my eggs to expand. This indicates that the elongation of the stipe or receptaculum is a growth process as advanced by Errera and Burt. The large number of eggs of the various species of Phallaids that I collected, together with the cool weather during November, forced me to devise some means whereby I could with little trouble hatch them, as there was no hot house convenient. At first, I used with fairly good success the following plan. I took a pine box one and a half to two feet deep and covered the bottom with clean white sand to the depth of eight to ten inches. The eggs were then washed and wrapped with tissue paper, leaving only the upper part free; they were then put into holes in the sand with only the upper and free surface

exposed, the sand being previously thoroughly wetted. The box was then covered with glass and placed near a wood stove and every eight or twelve hours — usually once at night and again early next morning, a gallon of water, hot as the hand could stand, was poured over the eggs and on the sand; by this means the sand and the air in the interior of the box was kept warm and moist. Eggs of *Phallus impudicus, Phallus rubicundus, Mutinus caninus,* and *Simblum texense* were thus hatched. The writer found great trouble in getting the eggs of *Simblum texense* to hatch in a moist chamber on account of a species of white mould attacking and destroying them. In warm weather all that is necessary is to keep the sand wet and the box in the sun light with the glass over it. Some sixty to a hundred eggs of *Simblum texense* were expanded by this means.

Later, when some one hundred or more eggs of *Phallus impudicus,* some as large as a man's fist and weighing one pound, were found, it became necessary to devise another way for hatching, as such a quantity of large eggs occupied much space and could not be kept warm by the methods given above. A hole was dug on the south side of my house and into this was set a large box about three feet long, three wide, and two feet deep; which was filled with sand to a depth of twelve to fourteen inches. Into the sand after wetting it were put the eggs, the box covered with glass and left exposed to the sun's rays during the day; at night it was covered with a blanket. In this box I hatched most of my *Phallus impudicus* specimens. The last egg expanded on January 23rd, two months after they were put in; but very few of the eggs of the other species would expand under these conditions. *Simblum sphaerocephalum* was exceedingly difficult to hatch; only two good specimens were obtained.

A careful study of the specimens of *Phallus impudicus* and *Phallus rubicundus,* as they were expanding, seems to indicate that *Dictyophora* is not a good genus. Many of the plants, especially of *Phallus impudicus,* showed veils of varying degrees of permanency — from a mere film to one of appreciable thickness, and in every respect, as to texture, size, thickness, and position comparable to the so-called veil of *D. ravenelii.* This veil in *Phallus impudicus* and *Phallus rubicundus* lies in the unexpanded plant as a zone of tissue next to the stipe. As the stipe elongates this membrane usually ruptures at edge of cap or beneath it, then as elongation continues bands and shreds of it may be left on the stipe. It will be found in one of three places and sometimes in all of them; first, as a veil hanging from top of stipe beneath the cap; second, as a distinct membrane in bands and patches on the stipe; third, as an enveloping sac-like membrane around the base of the stipe inside of the volva; here it seems to be a prolongation of the inner cup-like membrane of the volva

that fits closely to the base of the stipe. This membrance like that of *Phallus ravenelii* is not composed of pseudoparenchyma, but in every other respect it is a true veil. It seems to me that on the believers in the genus *Dictyophora* falls the burden of proving that the veils of those plants that they place under this genus are not *homologous* to this *veil in Phallus impudicus.*

That those species with a persistent, well developed, meshed pseudoparenchymatous veil, like *Phallus duplicatus,* deserve special rank seems not proven — for intergrading forms of more or less persistent and well defined veils are present in many species of Phallus; furthermore, the presence of a well defined veil in *Phallus impudicus,* the original type of the Phallus genus, would make this genus have as one of its characters a veil and the genus *Dictyophora* would now be identical in all respects to Phallus and wiuld therefore be reduced to synonomy.

The fact that the earlier writers did not mention this veil on *Phallus impudicus* is no proof that it did not exist, and when found would become as much a character of the genus as if it had been described at first. I have in my collection three species of Phalloids, *Phallus impudicus, Phallus rubicundus,* and *Phallus aurantiacus* (?)— the last from Hawaii, on which even when dry the veils show plainly, as much so as on *D. ravenelii.* I have further a specimen of *D. duplicata* from New York that shows two veils, one the usual meshed veil beneath the cap, the other membraneous and in patches on the stipe just as in the other Phalli. Now this second veil may be one of two things, either a part of a true *second* veil that was formed *beneath* the usual veil, or, what is more probable, it is the lower part of the usual veil left clinging to the stipe. That such is the character of the lower part of the veil of *D. duplicata,* see Burt in the Phalloideae of the United States, II. Systematic Account, pp. 387 and 388.

The veils in my specimens were especially pronounced in plants that were slow in opening both in *Phallus impudicus* and *Phallus rubicundus.* Those eggs that had been some three or four weeks in the "incubator" usually had thicker and more permanent veils than those that opened two or three days after collecting, while those found in the open fields had veils well developed if eggs opened during rainy weather. Also those plants that opened after cold weather came had veils. Specimens of *Phallus rubicundus* collected at Austin, Texas, during April, May and June, have no sign of a veil of any kind, not even the alcoholic material (of which I have some ten to fifteen specimens) shows any trace of a veil. Considering these facts it would seem that this layer of tissue that sometimes tears loos and forms a veil and sometimes does not, acts as an organ of nutrition in which is stored, or through which passes, food to be used by the stipe and cap; if this be the case then in warm damp weather the matur-

ing stipe and cap would use most of this in their development, so that at elongation of plant no real veil would appear. In other words, it would cling to the under side of the cap and to the inner surface of the volva; but if the amount of water during the growing season was in excess of the quantity usually present, then this tissue with others would be more strongly developed than normally and therefore would be more likely to appear as a veil at maturity of the plant; or if from any cause, as cold, removal from earth, etc., the later development of plant should be checked, then this tissue would appear as a veil; this is only an hypothesis the proof of which remains yet to be worked out. At any rate the fact remains that in these two species the veil may or may not be present, and when present may be a mere thin membrane or one of appreciable thickness and permanency that will and does persist when the plants are dried or when kept in fluids. The presence of a veil on *Phallus impudicus* has been noted and discussed before by Van Bambeke,* also by Ed. Fischer.†

Phallus impudicus, L. var. *imperialis,* Schw. (Figs. 1-4).— Eggs usually solitary, but sometimes in groups of two to eight individuals from a common root like rhizomorph, the mycelium and eggs pink changing to a dark purple tint when injured. Eggs ovate to irregularly globose, from two cm. tall by one and a half to two cm. thick to twelve cm. tall by ten cm. thick. Stipe fusiform hollow, white changing to cream white with age, four to twenty cm. tall by two to four cm. thick. Walls of stipe of several layers of chambers thick, which open into both inner and outer surface of the stipe as pits, chambers isodiametric pseudo-parenchymatous, stipe open at apex (perforate) and joined to pileus by a broad white collar.

Pileus conic-campanulate, strongly and deeply alveolate, reticulate, white, three to seven cm. tall and two to five cm. broad, floccose, gleba at first a greenish brown turning black-brown in age, strongly foetid. Veil wanting or when present membranous floccose, white beneath pileus or in bands and patches on stipe or clinging to stipe inside volva, attached to and continuous with inner cup-like part. Spores oblong, one and a half by four μ. Volva pink rupturing irregularly.

In rich loose soil, in open fields or near margins of thickets, along creeks, etc., never in well shaded places, Denton, Texas, and one specimen from Austin, Texas, Nov. to Jan.

This was our most abundant Phallus in Fall of 1902. It was first collected October the twentieth and specimens were found from then till the middle of January, 1903. On October the

* De l'existence probable chez Phallus impendicus d'un involucrum ou indusium rudimentaire, 1890. Botanisch Jaarbock.

† Neue Untersuchungen zur Vergleichenden Entwicklungsgeschichte und Systematik der Phalloiden, pp. 12-14. 1893.

twentieth the two large bunches of eggs were found in a low damp place, rich in vegetable debris, one bunch was so badly eaten by the fly larvae that none of the eggs hatched, but two of the eggs of the larger bunch hatched. This bunch is seen in photograph No. 1 then No. 2 shows it with two eggs hatched, and some had been removed from bunch being destroyed by the larvae.

On November the fourteenth, in an old cornfield near a small creek in a low but well drained place, some four or five eggs, also as many expanded plants and quite a number of decayed ones were found. All of the gleba had been cleaned off of the older plants by the flies and one with the gleba just beginning to deliguesce was a perfect mass of large blue bottle flies, so thoroughly had the flies done their work that not a drop of the gleba had fallen on the stipe or on the ground from any of the expanded plants. On November the twentieth in an old cornfield in a jatch of Johnson grass (*Sorghum halapense*), I found a second lot of eggs and plants, some twenty to thirty in all, and finally on November the twenty-third I collected fifty-three eggs and eight to ten expanded plants in twenty minutes' time, from a spot about ten yards square. Some of these eggs were as large as a man's fist, and one weighed fourteen ounces. This was also in an old corn field, on the margin of the same creek. These eggs were by far the finest and the largest I had yet found and their abundance fairly made my "eyes bulge;" from this "garden" alone, I gathered in all about one hundred eggs and plants. They were growing in limited areas, as if the mycelium had started from some central point and had spread for four or five yards in more or less of a circle.

I had to be careful not to step on the eggs they were so thick in the center of this circle; I just piled them up in heaps like potatoes, some fifteen to twenty in a pile. The eggs were usually about one-third to one-fourth out of the ground and being of a purplish tint and in bare soil they were easily seen. They were especially numerous in the old corn rows, often from one to four or more eggs being being found at the base of each old corn stalk, the mycelium usually filling the corn roots and extending down into the soil twelve to eighteen inches and then branchig out in all directions. All of this lot were collected after our first frost and freeze, but most of them opened in my "incubator."

As late as the middle of January, after snow, sleet and severe cold, I collected some four or five live eggs and two or three freshly expanded plants. The expanded plants were very short, the pilei barely being clear of the volva. The large eggs did not make such tall plants, the extra size making a larger pileus, more jelly, and thicker peridium of the volva. Often this inner peridium would be so thick and tough that it did not rupture

sufficiently for the entire pileus to emerge and so a large part — more than half in some cases — of the pileus and often all the gleba was torn off and remained in the volva.

Some of the eggs that remained in the incubator for three or four weeks before expanding had the lower part of the stipe, especially the portion remaining in the volva, stained with the purplish hue of the volva. This was noticeably true of plants from small eggs, which apparently were not fully matured when collected. These eggs opened, but did not make large plants, and the bases of the stipes and the inner cup adjacent to the stipe were stained by the purple juice from the volva.

It was on immature and depauperate specimens of this plant that Cragin founded *"Phallus purpuratus."* Here is a description made from plants hatched from the same lot of eggs as the normal *P. impudicus*, only the eggs were small and apparently immature. A comparison of this description with Cragin's will show that the plants are identical. Eggs globose, 1¼ to 1½ inches, smooth or wrinkled, firm or somewhat soft, of a purple-pink color, portion of plant exterior to volva about 2 inches, stipe of a spongy-cellular appearance, equal or fusiform, of 3-several layers of chambers thick, inner chambers largest, portion of stipe enclosed in volva suffused with pink, also inner portion of volva or cup in which the base of stipe rests, a deeper pink; stipe 3 in. tall by ½-inch thick, pileus pitted and reticulate about ¾-inch tall, conic-campanulate. The eggs from which this description was drawn were collected November 25 and opened December 26.

There is no doubt that Cragin's plant is only an immature and depauperate form of *P. impudicus* var. *imperialis*, caused by cold weather, for the plant on which his description was based was collected in October; in Kansas this would be after cold, frosty weather had come.

In eggs that stand for several weeks before opening, the jelly becomes watery and shrink in size, until the outer region of the volva lies against the unexpanded stipe and pileus, while the lower half of the volva being firmer and not so gelatinous, holds its shape and size. Eggs under such conditions look much like an acorn in its cup. This was noticed of other species of Phalloids also. It was probably such an immature specimen as this that Mr. Lloyd speaks of in his Mycological Notes. Among the 100 or more plants that expanded from the eggs were several with the margin of the pileus *sterile* for ¼ to ½ inch and more or less strongly crinkled to sinuate-dentate; this form would correspond to *Phallus iosmos* Burt, while *P. roseus* would be a larger form of *P. purpuratus* and probably due to the same causes. None of these seem to deserve even a variety rank.

Phallus rubicundus Bosc. (Figs. 5-8).—Eggs white, solitary or in groups of 2-6 individuals from a common mycelium, when in groups usually one large plant surrounded by small

ones, ovate to globose, 2-3 cm. tall by 1-3 cm. thick. Stipe cylindric-fusiform to fusiform, hollow, scarlet, 9-15 cm. tall by 1½ to 2½ cm. in diameter, walls of several chambers thick, which open onto outer and inner surfaces of stipe as pits; chambers isodiametric, pseudoparenchymatous; apex perforate or imperforate, but usually perforate as the plant ages, by scarlet top of apex falling entirely off of plant; joined to pileus by a narrow irregular scarlet collar or ring. Pileus conic, smooth or rugose, scarlet, sometimes extending below gleba into a narrow sterile border, whose edges are finely crinkled to dentate, pseudoparenchymatous, 1-2 cm. wide to 2-3 cm. tall. Gleba at first isabella color, becoming a dirty yellowish brown when deliquescing, odor very foetid. Veil wanting or when present, membranous floccose, white beneath pileus or in hands or patches on the stipe or clinging to stipe within volva as in *P. impudicus*. Spores oblong 2 x 4 μ or ovate-oblong 3-4 x 6-8 μ. In lawns and open grassy places Austin, Tex., April, May and Nov., 1900, or in old sandy fields near rotting oak stumps and along fences in sandy soil. Denton, Tex., Nov. to Jan., 1902 and 1903.

This species was very abundant at Austin, Texas, during the months of April and May, 1900, caused by the excessively wet season. All the Austin specimens were found on lawns or in other grassy unshaded places, often in groups of 4-6 plants, usually one large expanded plant surrounded by eggs of various ages, which usually produced much smaller plants than the first and central one, all attached to a common net work of mycelium, but usually not in contact as were the eggs of *P. impudicus*. Some eggs were two or three inches from central plant, but all within a radius of 4 inches and when the dirt was washed away were seen to be attached to a common network of white mycelial strands. This mycilium ramified in all directions among the old and decaying grass roots that lie some 3 or 4 inches below the living turf. The eggs in some of these bunches produced wee plants, often only one inch tall but perfect copies of their larger brothers.

The mycelium seems to be perennial in the soil as the owners of the lawn from which most of the plants were obtained, stated that every year for ten years they had noticed "the red stinking things on their lawn."

The caps of the Austin specimens show all degrees of roughness, some are smooth, other have upper part smooth and lower part wrinkled, some have one side smooth, the other rugose, while still others — usually the large plants — are strongly wrinkled over the entire surface, the ridges in all cases are longitudinal and more pronounced on lower half and at margin of the pileus. (See Fig. 6.) The caps of the Denton plants are smooth or only slightly rugose. This shows that too much stress should not be laid on the smoothness or rugosity of the pileus as it

varies materially in the same species. The Austin specimens were larger and in greater numbers than the Denton plants, due to the warmer weather and richer soil. The Austin plants often showed a sterile fringe from 2-4 mm. broad at base of caps while the Denton specimens did not have this sterile border; the Denton plants were solitary while the Austin ones were grouped. The spores of the Austin plants are of two types, one of the common size and shape 2-4 μ but intermixed with the mare found ovate to ovate-oblong spores from 3-4 and 6-8 μ in size; these large spores cling together in bunches of 2-8 at their smaller ends, indicating that they might not be true spores but only *basidia,* otherwise they have every appearance of true spores; the Denton plants have the usual type of spore. No veils were noticed on any of the Austin specimens at the time they were collected and a careful examination of alcoholic material (some 20 plants) shows no sign of a veil; apparently only the Denton plants have this character and some of them did not show it. The veil in this species is not as well developed or as persistent as the veil of *P. impudicus.* It was usually a mere membrane that disappeared as the plants aged, but is identical in position and characters with that of *Dictyophora ravenelii.* It was more pronounced on plants slow to expand under artificial methods. The volva occasionally ruptures circumciscily and the upper part is carried on the apex of the pileus. This is caused by the egg becoming too dry and the volva adhered to the apex, when the stipe elongated the volva ruptured as indicated. The same thing was seen by the writer at Ithaca, N. Y., in a specimen of *Mutinus caninus,* due to the same cause; it is a common occurrence with *Simbllum texense.*. That *P. rubicundus* is only a *red* form of *D. ravenelii* as suggested by Burt (The Phalloideae of the United States, II. Bot. Gaz. 22:385, 1896) I do not believe as I have never found any white forms or any approach to white ones among the many plants I have seen and collected in this state.

Mutinus caninus (Huds.) Fries (Fig. 9).— Eggs white, except exposed part which is pinkish brown, ovate to pyriform 2-3 x 3-4 cm., usually in groups of 4 to 20 individuals from a common network of mycelium. Stipe cylindric below gleba. but gleba bearing portion tapering to a point, 6-12 cm. tall by 1-1½ cm. thick, lower part of stipe orange red, upper part for about 2 cm. below gleba a deeper orange, gleba flesh color, 4-5 cm., conic, perforate. Sporogenous tissue or one layer of cells whose walls are very thick and open to inside of stipe, sterile part of thin walled chambers one or two cells thick. In sandy soil near base of Quercus stumps. Denton, Texas, Nov. and Dec. 1902.

Simblum sphaerocephalum Schlecht. (Fig. 10.)— Stipe geranium pink, 6-11 cm. tall x 1-1½ cm. thick, hollow, cylindrical

or slightly tapering toward base, walls of 1-2 or several chambers thick, which are many times longer than broad, opening outwardly as pits but not inwardly, constricted at juncture of pileus, pileus depressed globose, scarlet, 1 cm. tall by 2 cm. broad, meshes regular of 4-6 sides, isodiametric, 10-20 in number, each 3-4 mm. across, walls of meshes transversely rugose, left as a hollow net work after gleba deliquesces. Spores oblong, 2 x 4 μ.

Volva white, solitary, globose to ovate 2-3 x 3-4 cm., rooting. Gelatinous portion of eggs not continuous but divided into chambers by cortical plates that extend from bars of pileus to outer layer of the volva. On lawns, Austin, Texas, and at margin of thickets and in open sandy fields or along ravines in black soil. Denton, Texas. Oct., Nov. and. Dec. 1902 and 1905. A rather rare plant.

Simblum texense (Atkinson and Long) Long (Fig. 11). *Dictybole texense,* Atkinson and Long. — Stipe 4-8 cm. tall by 1-2 cm. thick, cylindrical or slightly tapering toward base, more or less angular and longitudinally furrowed, hollow, pale yellow, walls composed of 2-3 layers of chambers thick at middle of tipe but of only one layer of chambers at base, inner layer usually much larger than the others and composed of longitudinal chambers which are many times longer than broad, irregularly polygonal in cross section, opening neither inwardly nor outwardly. Pileus depressed hemispherical or often, in field specimens, cap-like and usually with remains of volva adhering to apex, composed of more or less isodiametric meshes, the outer row of which is usually free from stipe at its outer and lower margin, meshes very irregular in shape and size from 10-20 in all, 8-10 marginal, usual size 4-5 mm. across and of 4-6 sides, bars pale yellow only faintly transversely rugose, pileus on plants in field always more or less distorted so that the true character of the plant is difficult to determine, gleba mass brown, not readily deliquescent but usually persistent between the bars till rains or dews wash it off, when it does deliquesce, it blackens and has the odor of carrion. When *fresh* gleba and *entire* plant has a very pronounced and *pleasant amyl acetate* odour.

Volva circumscissile, upper part borne aloft on pileus, spores greenish hyaline, oval to ovate 3 x 7 μ. Eggs depressed globose to globose-ovate, 1-4 cm. in diameter, rooting, solitary, rarely in pairs from a common root, occasionally twin plants from same egg, gelatinous layer not continuous but divided into chambers by cortical plates which are prolonged from bars of meshes outward to the outer layer of volva and downward toward the base of the egg, the number of chambers corresponding approximately to the number of meshes in the pileus. In open grassy pastures, Sept.-Dec. This was by far our most abundant Phalloid during 1902, several hundred eggs and expanded plants being found. After every rain the eggs appear in great numbers over

the prairie pastures. This species seems to be especially adapted to xerophytic conditions, as the eggs will persist during dry weather in a dried up condition, but when rain comes they swell up and finally elongate. Several eggs were collected and allowed to dry and shrink till they became hard and apparently dead, they were then placed in water, which was at once absorbed and the eggs gradually assumed their normal condition, they were then put in a moist chamber and several expanded.

This plant is unique in many respects. First, its agreeable odour so different from the usual Phalloid; second, its ovate spores; third, its persistent gleba, which in the field specimens rarely deliquesces but dries up and remains on the pileus as a hard brownish mass to be finally washed off by the rains; fourth, the utter absence of all visits from insects of any kind, no flies were ever seen to visit them, even when the gleba had deliquesced and become black and foetid; no herbarium insects even will eat the dried plants, for I have them in my herbarium now after a lapse of 5 years, absolutely untouched by anything and yet exposed in an open box, while most of my other Phalloids have been badly damaged by a small beetle. Fifth, the great variability of its pileus as to shape, no two plants being alike especially when the elongation occurs in the open field. Sixth, its circumscissile volva, on most plants the upper part of the volva is carried up on top of the pileus as the stipe elongates and remains there as a persistent cap, usually covering all of the meshes except the outer and marginal row. This method of rupturing the volva is caused by the eggs becoming partially dried before elongation and the outer layer of the volva is thus brought into contact with the top of the pileus and adheres more or less firmly to it according to the amount of drying that the eggs have undergone, now when the plant begins to elongate the volva ruptures *below* this adhering portion and thus becomes circumscissile, the same phenomenon was noticed in eggs of *P. rubicundus* which had dried before expanding, also in eggs of *Mutinus caninus*. Eggs of *S. texense* that have not dried any before collection when put into a moist chamber ruptured the volva at the apex in the usual way as do most Phalloids. Some specimens of this plant when dry look much like a Lysurus so that this may be Ellis's *Lysurus texensis*.

It has been four years since the body of this article was written and only a stray Phalloid has been seen in that time; except in Oct. 1905, when some 30 or 40 specimens of *Simblum sphaerocephalum* were collected in a low damp place among tall grass and weeds; a few of these plants were nearly *white*.

Two other Phalloids have been reported from Texas, both of which are supposed to be in the Ellis Collection, now the property of Columbia University, but twice within the last four years has a careful search through this collection failed to bring to

light either plant. *Lysurus texensis* Ellis, and *Laternea triscapa* Turp. are the two plants reported from Texas, but apparently the specimens are lost as both Burt and myself have been unable to locate them.

EXPLANATION OF PLALES 102-106.

Fig. 1. Group of 8 eggs of *Phallus impudicus* var. *imperialis* from a common rhizomorph.
Fig. 2. Expanded plants from group of fig. 1.
Fig. 3. *Phallus impudicus* var. *imperialis,* typical plants.
Fig. 4. Phallus impudicus var. imperialis, showing veils; the middle plant a dried specimen with veil still pendent below pileus.
Fig. 5. *Phallus rubicundus,* showing rugosity of pileus. All specimens from Austin, Texas, and alcoholic material.
Fig. 6. Phallus rubicundus, non perforate plant.
Fig. 7. Phallus rubicundus, showing shreds of veil on stipes and one plant perforate.
Fig. 8. *Phallus rubicundus,* showing veil at base of pileus and remnant of volva at apex.
Fig. 9. *Mutinus caninus.*
Fig. 10. *Simblum sphaerocephalum.*
Fig. 11. *Simblum texense.*

All ⅔ natural size.

North Texas State Normal, Denton, Texas.

NOTES FROM MYCOLOGICAL LITERATURE. XXIII.

W. A. KELLERMAN.

Peck, Charles H.

"A New Species of Galera" — G. kellermani — is described in the July No. of the Journal of Mycology by Professor Peck, who adds: The distinguishing characters of this species are its broadly expanded or plane grayish brown pileus with its minutely granulose or mealy surface, its persistently striate margin and its very narrow gills becoming brownish with age. The indication of a veil is also unusual. A full-page half tone illustrates the new species.

Hedgcock, Geo. G. and Spaulding, Perley.

These authors outline a "New Method of Mounting Fungi Grown in Cultures for the Herbarium." The plan is to grow the specimens on rather stiff agar-agar and protect them (the agar plates having been divided into square blocks) by means of perforated cardboard — see Journal of Mycology for July 1906. They say that "This method of mounting has proven very convenient with specimens of Stilbum, Graphium, Ceratostomella, Hormodendron and other similar fungi; it is best, however, to poison the specimen after mounting, by spraying it with strychnine solution."

PHALLUS IMPUDICUS VAR. IMPERIALIS.

PHALLUS IMPUDICUS VAR. IMPERIALIS.

5. PHALLUS RUBICUNDUS. 9. MUTINUS CANINUS.

PHALLUS RUBICUNDUS.

10. SIMBLUM SPHAEROCEPHALUM. 11. SIMBLUM TEXENSE

Journal of Mycology, Vol. 12, July 1906.

This contains the following: Kellerman—Mycological Expedition to Guatemala; Charles—Lasiodiplodia on Theobroma cacao and Mangifera Indica; Hedgcock and Spaulding—New Method of Mounting Fungi Grown in Cultures for the Herbarum; Peck—A New Species of Galera; Arthur—Reasons for Desiring a Better Classification of the Uredinales; Morgan—North American Species of Lepiota; Morgan—Descriptive Synopses of Morgan's North American Species of Marasmius; Garrett—Field Notes on the Uredineae; Kellerman—Notes from Mycological Literature XX; Editor's Notes.

Kellerman, W. A.

An itinerary of a "Mycological Expedition to Guatemala" is given in the July number of the Journal of Mycology (1906), with some account of the general topography of the country, the climate, hydrography, the general character of the vegetation in the several regions visited, including Lakes Atitlán and Amatitlán, also three of the highest volcanoes.

Charles, Vera K.

The "Occurrence of Lasiodiplodia on Theobroma cacao and Mangifera indica," see Journal of Mycology, July, 1906, deals with a preliminary study of infected plants from Brazil and Florida. It is supposed that the species is L. tubericola E. & E. —to be determined by cultures, and reported later.

Bergen, Joseph Y. and Davis, Bradley M.

In a new and excellent text book called "Principles of Botany," Messrs. Bergen and Davis devote two chapters to Fungi, the first entitled "The Fungi and Their Relation to Fermentation and Disease" (pp. 227-271), and the second, "Summary of the Life Histories and Evolution of the Fungi," (pp. 272-4). The five classes are considered: Bacteria, *Schizomycetes;* Yeasts *Saccharomycetes;* the alga-like fungi, *Phycomycetes;* the sac fungi, *Ascomycetes;* and the basidia fungi, *Basidiomycetes.* Many text figures are used, also two full-page plates—one (colored) illustrating a Lichen, and the other an Agaric, a wound parasite (*Pleurotus ulmarius*).

Garrett, A. O.

Fasicle Two of "Fungi Utahenses," collected and distributed by A. O. Garrett, High School, Salt Lake City, Utah, is devoted exclusively to Puccinias, including two species of Aecidium. "Commencing with the next fascicle, the printing of the original descriptions will be discontinued."

Blakeslee, Albert Francis.

In the September number of the Botanical Gazette (1906) Albert Francis Blakeslee discusses the "Differentiation of sex in Thallus Gametophyte and Sporophyte." Referring to the previous paper in which was given an account of Zygospore Germinations in Some Mucorineae, the author says the purpose of the present paper is to point out the bearing which the investigations already made in this group may have upon the questions of sexuality in other forms.

Kauffman, C. H.

A contribution from the Botannical Department of the University of Michigan, published in the Botanical Gazette, September 1906, is devoted to "Cortinarius as a Mycorhiza-producing Fungus." The author, C. H. Kauffman, publishes a new species, *Cortinarius rubipes,* and its study is the basis for the article here noted. He says his own observations seem to show that it is undoubtedly a fact that one fungus may be attached to trees of very different families. Cortinarius rubipes Kauff. is connected with three forest symbionts.

Smith, Ralph E. and Smith, Elizabeth H.

Under the title of "A New Fungus of Economic Importance" the authors give an account of a destructive rotting of lemons in Southern California, which proved to be caused by a hitherto undescribed fungus. A new genus is proposed, *Pithiacystis,* which differs from Pithium in mode of swarmspore formation, and from Pithiopsis in habit. It is more exactly intermediate between the Saprolegnieae and Peronosporeae than either of these genera. The new species is called *Pithiacystis citrophthora,* parasitic on lemons, and occasionally on other Citrus fruits, causing decay of green fruit on the tree and in the storehouse.

Journal of Mycology, Vol. 13. Jan. 1907.

The table of contents of this No. reads as follows: Long — Notes on New Species of Ravenelia; Atkinson — A New Entoloma from Central Ohio; Kellerman — Fungi Selecti Guatemalenses, Exsiccati, Decade I; Morgan — North American Species of Lepiota (continued); Kellerman — Index to North American Mycology; Index to Volume 12.

Long, W. H.

In the "Notes on new or rare Species of Ravenelia," Prof. W. H. Long publishes critical comments on many species of this interesting genus, and describes two new species, namely: Ravenelia piscidiae (for Florida) and Ravenelia arthuri (from Jamaica). He states that three characters of great importance should always be noted, to-wit, (1) the position of the sori,

whether sub-epidermal or sub-cuticular; (2) the number and position of the germ spores of the uredo-spores; and (3) the position and number of the cysts. In his opinion R. mexicana, R. mimosae-sensitivae and R. inconspicua are all one and the same species. Four other species [he continues] are so closely related that they should be considered as one species, viz.: R. expansa Diet. & Holw., R. fragrans Long, R. humphreyana P. Henn. and R. pulcherrima Arthur.

Fungi Columbiani, Century XXIII. Dec. 10, 1906.

Mr. Elam Bartholomew distributed this installment of his exsiccati December 10, 1906. A wide range of species is represented — the only very large number of species in any genera being those of Puccinia, over a dozen; and Uromyces, little less than a dozen.

Atkinson, Geo. F.

A description and a full page plate is given by Professor Atkinson of "A new Entoloma from Central Ohio," Entoloma subcostatum. See Journal of Mycology, November, 1906.

Kellerman, W. A.

The labels are printed for the first decade of "Fungi Selecti Guatemalenses exsiccati," in the November No. of the Journal of Mycology. The species are as follows:

1. Graphiola phoenicis (Moug.) Poit., on Thrinax sp. indet.
2. Melampsora bigelowii Thüm., on Salix humboldtiana H. B. K.
3. Puccinia cannae (Wint.), P. Henn., on Canna indica L.
4. Puccinia cognita Syd., on Verbesina fraseri Hemsl.
5. Puccinia cynanchi Lagerh., on Philibertiella crassifolia Hemsl.
6. Puccinia heterospora B. & C., on Sida cordifolia L..
7. Puccinia rosea (D. & H.) Arthur, on Ageratum conyzoides L.
8. Ravenelia humphreyana Diet., on Poinciana pulcherrima L.
9. Ravenelia spinulosa Diet. et Holw., on Cassia biflora L.
10. Ustilago panici-leucophaei Bref., on Panicum leucophaeum H. B. K.

In following decades new and interesting tropical species are promised.

Kellerman, W. A.

The alphabetical list of articles, authors, subjects, new species and hosts, new names and synomyns, entitled "Index to North American Mycology," which is complete for the time subsequent to Dec. 31, 1900, was continued in the JOURNAL OF MYCOLOGY throughout the year 1906, installments appearing in the March, May, September, and November Nos.

Mangin, L. et Viala, P.

The Bureaux de le "Revue de Viticulture," Paris, issues a 17-page illustrated account of the new fungus — "Sur le Stearophora radicicola, champignon des Racines de la Vigne" — which the authors detected in the living tissues and of which they say: "nous avions d'abord songé a rattacher cette espè nouvelle au groupe, d'ailleurs mal nommé, des Endoconidium; les données vague et insuffisantes, publiées sur la genése des spores dans ce genre, ne nous ont pas permis de confirmer cette assimilation, et nous espérons pouvoir établir, dans un travail ultérieur, que le Stearophora constitue un groupe spécial représentant vraisemblablement un type primitif d'Ascomycetès à asques dissociés."

Fungi Utahenses, Fascicle Three, July 19, 1906.

The Nos. 51-75 include twenty pkts. of Puccinia, one Caeoma, two Chrysomyxa, one Hyalospora, and one Aecidium. Author, A. O. Garrett.

Lawrence, W. H.

In Bulletin 70, Experiment Station, State of Washington, we find an account of the "Powdery Mildews of Washington," the Erysiphaceae. Following the general account is a key to the genera, then the genera and species are fully described, the appendages and spores illustrated by one full-page plate.

Douglas, Gertrude E.

This is a very interesting study, "The Rate of Growth of Panaeolus Retirugis," Contribution No. 113 from the Department of Botany of Cornell University. Measurements were taken morning and evening during the latter part of March and early April — complete records obtained for 18 plants, the rate of growth then worked out in curves. The stem grows slowly at first, then very rapidly 40 to 56 hours, for about 24 hours slowly again until it ceases. Growth is more rapid by night than by day.

THIRD SUPPLEMENT TO NEW GENERA OF FUNGI PUBLISHED SINCE THE YEAR 1900, WITH CITATIONS AND THE ORIGINAL DESCRIPTIONS.

COMPILED BY P. L. RICKER.

(*Continued from page 67.*)

VI. AECIDIOMYCETAE.

[Aecidiomycetae.]

ALLODUS Arthur, n. g. Aecidiaceae. Résultats scientifiiques du Congrès international deBo tanique Wien, 1905:345. 1906.

"Pyknien kugelartig oder flaschenförmig, mit mündungsparaphysen; Aecien mit Peridium, Aeciosporen mit farbloser (selten goldgelber) membran; Telien gewöhnlich zuerst in den Aecien oder um dieselben entstehend, später unabhängig; Teliosporen zweizellig mit farbiger membran; Uredinen fehlen."

[Aecidiomycetae.]

AMERIS Arthur, n. g. Aecidiaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905:342. 1906.

"Telien nackt, Teliosporen einzellig, membran farbig, stark warzig, Keimporen zwei oder mehr, seitlich. Aecien und Uredinien fehlen."

[Aecidiomycetae.]

ARGOTELIUM Arthur, n. g| Aecidiaceae. Résultats scientifiques du Congrès international de Botinique Wien, 1905:343. 1906.

"Pyknien kugelartig oder flaschenförmig; Uredinien pulverig, Urediniosporen mit farbiger Membran, stachelig; Teliosporen zweizellig durch Querwände, membran farbig; Aecien fehlen."

[Aecidiomycetae.]

BUBAKIA Arthur, n. g. Uredinaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905:338. 1906.

"Pyknien und Aecien unbekannt. Uredinien ohne Paraphysen oder Peridium; Uredinosporen einzeln auf Stielen gebildet, membran gefärbt, stachelig, keimporen undeutlich; Telien subepidermal, mehr als eine Schlicht dich. Teliosporen kompakt, membran farbig, dünn oder in den obersten zellen oben verdickt."

[Aecidiomycetae.]

CERATELIUM Arthur, n. g. Uredinales. Bulletin of the Torrey Botanical Club, 33:30. 1906.

"Pycnia and aecia unknown. Uredinia with peridium, centrally dehiscent, urediniospores borne singly on pedicels, wall nearly colorless, echinulate, pores obscure, contents colored. Telia with spores united into a short column, or globoid mass, arising at first from bed of the uredinia, waxy; teliospores one-celled, wall smooth, nearly or quite colorless."

[Aecidiomycetae.]

CHNOOPSORA Diet. n. g. Uredinales. Annales Mycologici, 4:423. 1906.

"Pycnidiis depressis, sub epidermide plantae nutricis immersis. Aecidiis epidermidem perrumpentibus irregularibus sine peridio; aecidiosporis catenulatis. Soris telutosporiferis ceraceis crustaceis, sub epidermide erumpentibus nudis; telutosporis unilocularibus, rarius, septo transverso vel obliquo divisis, non omnibus in eodem soro simul muturantibus, sed posterioribus inter prius formatas se immittentibus, maturatis promycelio quadriloculari mox germinantibus."

[Aecidiomycetae.]

CIONOTHRIX Arthur, n. g. Uredinaceae in Underwood and Britton, North American Flora, 7:124. 1907.

"Cycle of development includes only pycnia and telia, both subepidermal.

"Pycnia deep-seated, flask-shaped, with ostiolar filaments.

"Telia erumpent, the catenulate spores adhering to form a filiform column, horny when dry. Teliospores ovoid, one-celled; wall slightly colored, thin, smooth."

[Aecidiomycetae.]

CYSTINGOPHORA Arthur, n. g. Aecidiaceae. In Underwood and Britton, North American Flora, 7:131. 1907.

"Cycle of development includes pycnia, aecia and telia, with distinct alternating phases; autoecious. Pycnia subcuticular, other sori subepidermal.

"Pycnia low-hemispherical; hymenium flat; ostiolar filaments wanting.

"Aecia erumpent, cylindrical. Peridium dehiscent at apex, margin erect. Aeciospores ovoid; wall colored, finely verrucose.

"Telia erumpent, definite, teliospores fascicled on compound stalks, forming heads bordered by hyaline cysts, each spore one- or two-celled; wall colored, smooth or verrucose."

[Aecidiomycetae.]

DENDROECIA Arthur, n. g. Aecidiaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905:340. 1906.

"Pyknien subkutikular; Telien subkutikular oder subepidermal, Teliosporen in zusammengesetzten Köpfen, die Cysten tragen."

[Aecidiomycetae.]

DICHEIRINIA Arthur, n. g. Aecidiaceae. In Underwood and Britton, North American Flora, 7:147. 1907.

"Pycnia and aecia unknown, the latter possibly wanting.

"Uredinia encircled by paraphyses, subepidermal. Urediniospores borne singly on pedicels, echinulate.

"Telia subepidermal. Teliospores free, more than one on each pedicel, 1-celled; pore one, terminal."

[Aecidiomycetae.]

DISCOSPORA Arthur, n. g. Aecidiaeceae. In Underwood and Britton, North American Flora, 7:149. 1907.

"Cycle of development includes pycnia and telia. Pycnia subcuticular, telia subepidermal.

"Pycnia hemisphaerical or frustum-like; hymenium flat; ostiolar filaments wanting.

"Telia erumpent, definite. Teliospores borne singly on pedicels, one-celled, flattened above and below; wall colored, verrucose."

[Aecidiomycetae.]

EARLEA Arthur, n. g. Aecidiaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905:341. 1906.

"Pyknien subkutikular; Aecien ohne Peridium, unbestimmt Aeciosporen mit farbloser, warziger membran; Telien subepidermal, Teliosporen vier- oder mehrzellig durch Querwände, membran gefärbt, Keimporen zwei in jeder Zelle und seitlich. Uredinien nicht vorhanden."

[Aecidiomycetae.]

GALLOWAYA Arthur, n. g. Coleosporiaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905:336. 1906.

"Telien hervorbrechend, in die Augen fallend, gallertartig, Teliosporen sessil, seitlich zusammengedrückt, einzellig, Membran glatt, farblos, am Scheitel verdickt und gallertartig; Aecien und Uredinien abwesend."

[Aecidiomycetae.]

KLEBAHNIA Arthur, n. g. Aecidiaceae. Résultats scientifiques du Congrès internatnonal de Botanique Wien, 1905:345. 1906.

"Pyknien kugelartig oder flaschenförmig, mit mündungsparaphysen; Urediniosporen mit farbiger Membran; Teliosporen einzellig mit farbiger Membran; Aecien fehlen."

[Aecidiomycetae.]

LYSOSPORA Arthur, n. g. Aecidiaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905:340. 1906.

"Merkmale der Gattung Tranzschelia, aber ohne Uredinien."

[Aecidiomycetae.]

MACALPINIA Arthur, n. g. Aecidiaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905: 340. 1906.

"Teliosporen mehr als eine auf einem Stiel gebildet, einzellig. Aecien und Uredinien fehlen."

[Aecidiomycetae.]

MAPEA Patouillard, n. g. Uredinales. Bulletin trimestriel de la Société Mycologique de France, 22: 46. 1906.

"Uredinaearum. Sori erumpentes, applanati, orbiculares, lati; ceracei, radio-plicati, ambitu sinuosolobati, undique fertiles.

"Sporae (uredosporae) fuscidulae, ovoideae, verruculosae, stipitatae."

[Aecidiomycetae.]

MELAMPSOROPSIS (Schröt.) Arthur, n. g. Uredinaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905: 338. 1906.

"Typus Chrysomyxa Ledi (A. u. S.) De B. auf Ledum palustre."

[Aecidiomycetae.]

NECIUM Arthur, n. g. Uredinaceae. In Underwood and Britton, North American Flora, 7: 114. 1907.

"Cycle of development includes telia, which fill epidermal cells, and possibly pycnia.

"Telia indehiscent, forming continuous layers, more or less distinguishable as compound sori. Teliospores oblong or prismatic, apparently one-celled, wall smooth, slightly colored."

[Aecidiomycetae.]

NEPHLYCTIS Arthur, n. g. Uredinales. Journal of Mycology, 13: 31. 1907.

"Cycle of development includes pycnia and telia, both subcuticular.

"Pycnia hemispherical, hymenium flat, without ostiolar filaments.

"Telia erumpent, without peridium or paraphyses; teliospores two-celled by transverse septum, colored, with a usually obscure hygroscopic layer, sparsely papillose, pores one in each cell, apical in upper cell, near the pedicel in lower cell; pedicels without appendages."

[Aecidiomycetae.]

NYSSOPSORA Arthur, n. g. Aecidiaceae. Résutats scientifiques du Congrès international de Botanique Wien, 1905: 342. 1906.

"Teliosporen in drei dreieckige Zellen durch schräge Scheidewände geteilt, Membran farbig, stachelig, Keimporen zwei oder mehr, seitlich. Aecien und Uredinien fehlen."

[Aecidiomycetae.]

PHYSOPELLA Arthur, n. g. Uredinaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905: 338. 1906.

"Pyknien und Aecien unbekannt. Uredinien von zahlreichen eingebogenen Paraphysen umgeben, ohne Peridium; Urediniosporen einzeln auf Stielen gebildet, Membran farbig, stachlig, Keimporen undeutlich; Telien unter der Epidermis, mehr oder weniger linsenförmig, mehr als eine Schicht dick. Teliosporen kompakt, Membran farbig, dünn, oder die obersten Zellen oben verdickt."

[Aecidiomycetae.]

POLIOMA Arthur, n. g. Uredinales. Journal of Mycology 13. 29. 1907.

"Cycle of development includes pycnia and telia, both subepidermal.

"Pycnia flask-shaped or globoid, central cavity usually large, ostiolar filaments apparently wanting.

"Telia erumpent, somewhat indefinite, without peridium or paraphyses; teliospores pedicelled, two-celled, wall very pale or colorless, homogenous, smooth, one pore in each cell and apical. Spores usualy germinate upon maturity."

[Aecidiomycetae.]

POLYTHELIS Arthur, n. g. Aecediaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905: 341. 1906.

"Merkmale der Gattung Tranzschelia, aber ohne Aecien und Uredinien."

[Aecidiomycetae.]

PROSPODIUM Arthur, n. g. Uredinales. Journal of Mycology, 13: 31. 1907.

"Cycle of development includes pycnia, uredinia and telia, all subcuticular.

"Pycnia hemispherical, hymenium flat, without ostiolar filaments.

"Uredinia early naked, encircled by paraphyses; urediniospores borne singly on pedicels, wall colored, echinulate, often with a gyroscopic layer.

"Telia erumpent, surrounded more or less by paraphyses; teliospores two-celled by transverse septum, wall colored, with a thin, hygroscopic, hyaline layer, sparsely papillose, pores one in each cell, apical in upper cell, near the pedicel in lower cell; pedicel refractive, usually appendaged."

[Aecidiomycetae.]

SPIRECHINA Arthur, n. g. Uredinales. Journal of Mycology, 13: 30. 1907.

"Cycle of development imperfectly known; only uredinia and telia recognized, both subepidermal, but judging from analogy also possessing subcuticular pycnia.

"Uredinia erumpent, definite, without peridium or paraphyses; urediniospores borne singly on pedicels, ellipsoid, wall nearly colorless, echinulate-verrucose, pores obscure; contents colored.

"Telia erumpent, definite, without peridium or paraphyses; teliospores borne singly on pedicels, obovate, one-celled, wall nearly or quite colorless, smooth, pore apical."

[Aecidiomycetae.]

TELOSPORA Arthur, n. g. Aecidiaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905: 346. 1906.

"Pyknien kugelartig oder flaschenförmig mit Mündungsparaphysen; Teliosporen einzellig, Membran farbig; Aecidien und Uredinien fehlen."

[Aecidiomycetae.]

TRANZSCHELIA Arthur, n. g. Aecidiaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905: 340. 1906.

"Pyknien subkutikular, kegelartig; Aecien mit Peridium, das am Scheitel aufbricht, Aeciosporen mit farbiger, warziger Membran; Uredinien nackt, mit Paraphysen, die mit den einzeln auf Stielen gebildeten, warzigen, oben dunkler gefärbten Sporen vermischt sind; Telien etwas pulverig, Teliosporen zweizellig und sich leicht in zwei Teile spaltend, Membran stark warzig."

[Aecidiomycetae.]

UROMYCOPSIS (Schröt.) Arthur, n. nov. Aecidiaceae. Résultats scientifiques du Congrès international de Botanique Wien, 1905: 345. 1906.

"Pyknien kugelartig oder flaschenförmig, mit Mündungsparaphysen; Aecien mit Peridium, Aeciosporen mit farbloser (selten goldgelber) Membran; Telien gewöhnlich zuerst in den Aecien oder um dieselben entstehend, später unabhängig, Teliosporen einzellig, Membran farbig; Uredinien fehlen."

(*To be continued.*)

INDEX TO NORTH AMERICAN MYCOLOGY.

Alphabetical List of Articles, Authors, Subjects, New Species and Hosts, New Names and Synonyms.

W. A. KELLERMAN.

(*Continued from page 87.*)

BOVISTELLA ohiensis Morgan. [Mycenastrum ohiense Ellis & Morgan. Scleroderma ohiense De Toni, Sacc. Syll.] Lloyd, Myc. Notes, 23:279. Aug. 1906.

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(*To be continued.*)

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EDITOR'S NOTES.

In a Paris letter of July last Mr. C. G. Lloyd says: "There has been so much changing of names lately in the Polyporii that we feel it well to state our position in this regard. The most and best systematic work on Polyporus was done by Fries. His system and names have been in use for two generations, and are familiar to all. We therefore feel that no attempt should be made to change them, except in very exceptional cases. . . As to the genera, the question is not so simple. The genus Polyporus is too large and should be broken up, but I feel that as much of the old should be retained as possible, particularly the four leading sections with which we are all familiar." I need not add that Mr. Lloyd condemns very emphatically the work that has been done the last few years in making new genera of polyporoids. In fact we must admit that at the hands of a number of competent mycologists the work here alluded to has not found favor.

We quote the above and allude to the situation there commented upon, to emphasize the difference that obtains between that case and the one presented by such work as is outlined in the review in the first part of this No. of the Journal. To Dr. Arthur's scheme it is expected that some, possibly many, will object; for here too is "a vast array of new names." When we read "Pyropolyporus," "Ganoderma," "Coriolus," we get no new idea, at least no new information is suggested. But when we are presented with "Uredinatae," Pucciniastratae," "Chrysomyxatae," "Cronartiatae," we must form a new conception, and look from a new point of view. So also the "vast array" of new genera or new meaning in old genera, as "Cronartium," "Cerotelium," "Cionothrix," "Alveolaria," "Baeodromus," "Endophyllum," and Pucciniosira," stand in each case for advanced views based on advanced knowledge and new valuations.

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